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ABSTRACT

An informal field study to design a system of beginning writing for the prefirst-grade child is presented in this paper, following a review of the literature. A series of questions are then raised regarding what letter form should be taught first, how letters should be grouped for instruction, and what verbal references should be used for beginners. The paper then lists two objectives leading toward the major goal of designing a program to teach children to write before they can read: teaching them to make the author's modified italic alphabet and teaching them to associate each alphabet letter with its major speech sound in English rather than its alphabet name. Next, the paper discusses the sequence for teaching letters and curves, and experiences in teaching alphabet writing. Finally, the paper describes a comparative study, which tested children taught with the author's write-to-read program in 1974-75, and concludes that teaching writing shows promise as an effective way to promote reading readiness in kindergarten. Graphics illustrating the text are included. (EL)

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WRITING BEFORE READING

OBJECTIVES

The major objective of this long term field study was to determine whether or not teaching Kindergarten pupils to WRITE independent compositions would make a significant difference in their readiness to read.

NEED FOR THIS STUDY

There has been a nation-wide trend toward higher academic expectations of Kindergarten pupils during the last two decades. Factors which have influenced this trend are:

1. The aftermath of Sputnik,
2. The growing concern in the 60's for the education of children from low income families,
3. The rapid growth of the preschool movement and the acceleration of child care centers. Both of these are directly related to the growth of the numbers of young working mothers from all economic segments of the population.

Documentary evidence of this trend toward higher expectations of Kindergarten pupils is shown on the graphs that follow. When the publishers of the Stanford Achievements Tests set out to update these materials in the post-Sputnik period they sent their research specialists around the country to determine "what children were learning in 1973 as compared to 1964." (Psychological Corporation 1973) Perhaps the report should have stated what children were expected to learn, or what teachers were expected to teach, rather than "what children were learning."

The following excerpts from the publisher's research clearly show a much higher expectation for Kindergarten students in the interval between 1964 and 1973.

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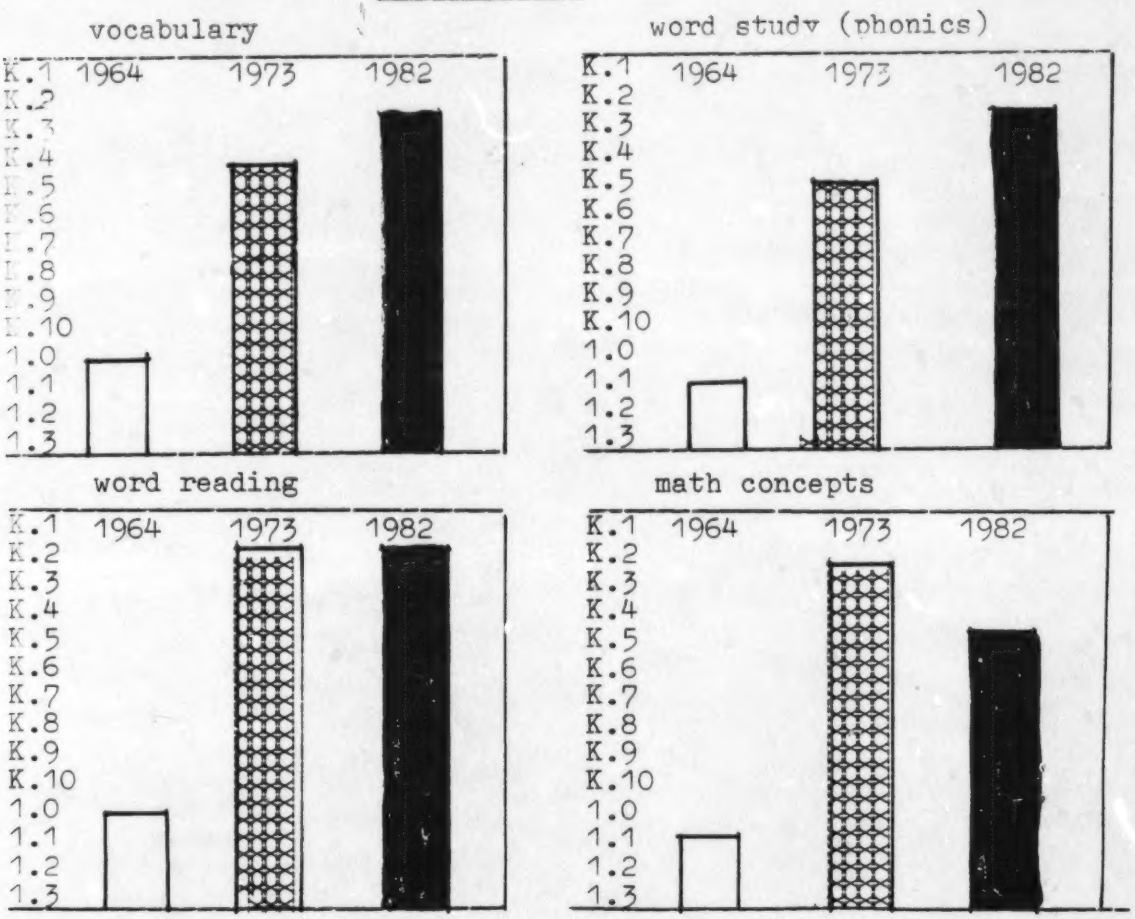
American Guidance Service brought this study more up to date by comparing expectations on the 1973 edition with the 1982 edition of the same test. It is apparent that the same content expected of students in Vocabulary at the beginning of First Grade in 1964 was expected at the fourth month of Kindergarten in 1973. This changed ever further in 1982 to the second month of Kindergarten. Word Study (phonics) shows a similar change. Word Reading changed dramatically from 1964 to 1973 but stabilized in 1982. Math concepts changed significantly from 1964 to 1973, but expectations for Kindergarten lessened slightly in 1982. This is probably due to more stress on calculation and less on understanding in more current math programs.

EXPECTATIONS



Traditional expectations of American Kindergarten pupils include a variety of pre-reading tasks, depending upon the teacher's philosophy, administrative decree, or the published program used. These are presumed to be foundation skills for the reading program which follows. The variety includes:

1. Naming alphabet letters, either upper or lower case, or both,
2. Copying alphabet letters, either upper or lower case, or both,
3. Memorizing alphabet order, through visual or auditory channels, or both,
4. Recognizing speech sounds that are alike, either in isolation, or in beginning, medial, or ending positions in spoken words, (Most programs teach only part of the speech sounds used by young children in their every day speech. Some teach twenty six speech sounds to match the alphabet. Some teach only consonant sounds.)
5. Rhyming ending syllables by ear,
6. Matching alphabet letters to speech sounds, and the reverse,
7. Recognition by sight of common printed words, such as pupils' names, color names, numeral names, and common nouns and verbs.

A less common practice at this grade level is the teaching of blending speech sounds into words, either by ear alone, or by actually looking at the letters.

This study proposed that, if all of the above Readiness activities were not taught, but replaced, instead, with directed <u>writing</u> activities, such as:

1. Writing single alphabet letters from dictation of their most common speech sounds,
2. Writing syllables and short words with common, regular spelling patterns from dictation,

3. Participation in independent composition with invented spelling (self dictation with emphasis on writing the speech sounds said aloud, rather than dependence on visual memory of words, or on auditory memory of the sequence of alphabet names in words),
4. Encouraging every pupil to draw every day, in order to record his or her real or imagined experiences (to build symbolic activity, visual imagery, as well as the necessary eye-hand coordination for writing.
5. Expansion of sound-symbol correspondence activities to include all the speech sounds commonly used by Kindergarten age children (about 38),

Would pupils then reverse the process of ENCODING to DECODING, by themselves? Would they figure out how to read without direct instruction in reading, or pressure from home or school to do so?

SURVEY OF LITERATURE

Is independent composition by Kindergarten pupils encouraged in American schools?

An extensive summary of common practices in American schools (Chall 1967 and 1983) reports that, except for some simple copying exercises of letters and words, the teaching of independent composition is usually postponed until Reading is well established (either late First or Second Grade).

There is a current trend toward more use of what is called Language Experience. The most common application of this method is dictation of the child's own language to an adult by the child. Sometimes the child then copies what the adult has written. Neither of these, either copied or not copied, is true independent written composition.

Does early writing lead to early reading?

Durkin's (1966) study of children who read before First Grade indicates that many early readers are also "early scribblers." These children go on long, sustained writing "binges" such as making calendars, making lists of names and addresses. These self-imposed tasks show unusually long attention spans for writing activities.

Are there stages of early scribbling? Is there a hierarchy of steps leading to making written symbols?

Kellogg's long term study (since 1928) of over a million drawings by children from around the world shows us that all children, regardless of their culture, go through the identical steps of drawing, leading to making symbols.

1. Uncontrolled scribble.....
2. Controlled scribble (child consciously tries to control direction).....
3. Scribbled shapes.....
4. Closed line shapes.....
5. Divided shapes.....
6. Division lines extending into rays.....
7. Empty centers with rays on exterior.....
8. Eyes appear.....
9. Rays elongated for legs.....

Kellogg's study also indicates that when a child, of any age, has arrived at stage 8 or 9, he or she usually NAMES the picture. This is his or her first true written symbol (something that represents something else). Kellogg's analysis of her age-dated drawings tells us that this spontaneous symbol usually occurs about the fourth birthday.

Differences, of course, would depend upon opportunity and encouragement to scribble, as well as any physical, emotional or neurological differences. Presentation of model drawings to copy would also interfere with the natural development of symbolism, and change the age at which symbols usually appear. The large number of children studied by Kellogg, however, tends to give credence to the four year old age of appearance.

Are some writing strokes easier to make than others? At what ages do they appear in children's scribbling?
Beery's (1981) survey of fifty years of studies in the field of visual-motor integration summarizes the work of over 90 specialists in the field. Beery gives the average age when strokes can be imitated or copied on the chart that follows.

Beery defines "imitation" as the child's reproduction of a form after the examiner has demonstrated how to draw it. "Copy" is the direct reproduction of a form without a demonstration. Imitation is thus easier than copy. Imitation is a teaching act. Copy is a testing act.

Because of the construction of the human body, the natural production of the diagonal toward the body mid-line would be reversed in difficulty for a person using the left hand. The diagonal toward the right would then appear at 4 years, 4 months and the diagonal toward the left not till 4 years, 7 months. Beery, however, does not make this distinction.

Beery Scale

		Imitate*	Copy
vertical line		1 year 9 months	2 years 10 months
horizontal line		2 years 6 months	3 years 0 months
closed line		2 years 9 months	3 years 0 months
vertical-horizontal cross			4 years 1 month
diagonal toward left			4 years 4 months
square			4 years 6 months
diagonal toward right			4 years 7 months

*There is no imitation scale after the closed line.

Are there sex differences in beginning writing tasks?
Maccoby and Jacklin (1974) have presented an exhaustive annotative bibliography of over 1400 research studies of sex differences published since 1965. Genetic studies show evidence of a recessive sex-linked gene that contributes an element to high spatial ability. Approximately 50 percent of men and 25 percent of women show this element phenotypically. This visual-spatial ability should give the advantage to males in early recognition of shapes or letters.

How can we prevent letter reversals in Kindergarten pupils when young children's knowledge of left and right for objects outside the body is sometimes not fully developed until age 7 or later?
Bugelski (1971) compiled and analyzed psychological laboratory research as applied to teaching from 1880 to 1971. He answers this question simply, "Analyze a skill into components and test for or train the components separately." Also,"If the teacher suspects that something the students are learning is going to be interfered with, he can see to it that students overlearn the first item before teaching the second, thus making it less subject to interference." Following Bugelski, left-oriented letters and right-oriented letters should thus be taught separately.

Has instruction in Writing before Reading been tried before?
Montessori, when working with very young children, the disadvantaged, and the retarded, began literacy instruction with writing. Lillard (1972) expresses the Montessori philosophy, "In writing the child expresses his own thoughts through symbols. He does not have to search for meaning. He already knows the meaning of his own thoughts. In Reading he must comprehend the thoughts of another. Writing is thus a known to him, for he is giving his own language to another. In Reading he must deal with an unknown-- the thoughts of another. The latter is obviously a far more complicated procedure."

Montessori also wrote from her own experience, "Teach young children to write and they will explode into reading spontaneously."

INFORMAL FIELD STUDY TO DESIGN A SYSTEM OF BEGINNING WRITING

The author set out to design a system of beginning writing for the pre-First Grade child (late fours and fives). Bruner's (1966) recommendations for a throy of instruction were followed in developing the design, with his four major features:

1. A STRUCTURAL FEATURE: This feature calls for a theoretical organization of a body of knowledge in some relatively optimal form so that the subject matter can be manipulated and presumably, grasped by individuals at various levels of ability.
2. A SEQUENCE FEATURE: A pattern or program of the arrangement of a given content must be developed for most effective appreciation of the structure.
3. A MOTIVATIONAL FEATURE: The theory must spell out what experiences develop predispositions for learning.
4. A REINFORCEMENT FEATURE: Rewards and punishments must be specified and programmed with the basic intent to switch from immediate and extrinsic rewards as soon as it is feasible to do so.

Following Bruner's lead, answers were needed for the following questions:

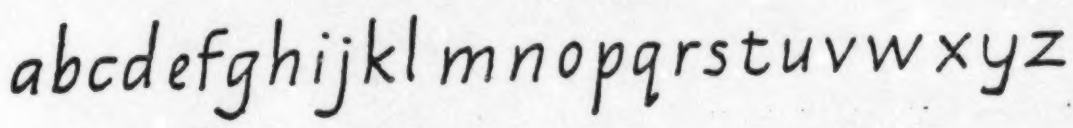
STRUCTURE

What letter forms should be taught first to young children?

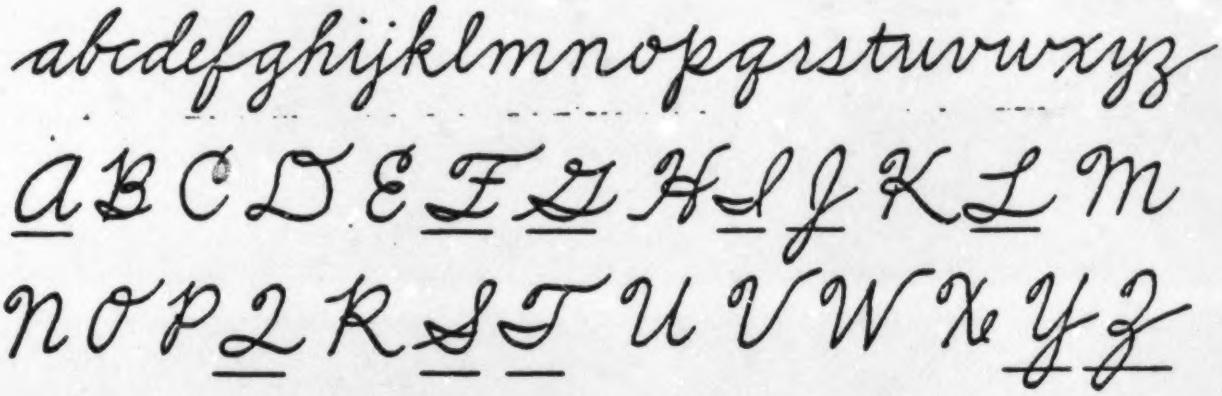
Alphabet history tells us that, as the centuries passed, the natural tendency of the hand to round corners, to leave out parts of letters, to curve straight letters, led to a variety of styles evolving from the original Roman capital forms. Each nation existing in the eighth century had its own form of simplified alphabet letters.

Charlemagne was instrumental in adopting a system of common symbols to be used throughout the continent. His alphabet was slightly revised after the Renaissance and named the Humanist Book Hand. Roman capitals were retained for initial letters of names and sentence markers. This alphabet was so clear and readable that it served as the model for the first moveable type designs. Later, the Humanist Book Hand became slightly slanted, circles changing to elipses for speed in copying church manuscripts, and named Chancery Cursive. Italian scribes developed a variation of this alphabet which was called Italic. This form simplified Chancery Cursive primarily by eliminating the initial up-stroke on letters which curve toward the left side. By beginning these letters (a, c, d, g, q) at the top of the curve, rather on the right side, an extra up-stroke was eliminated.

italic alphabet

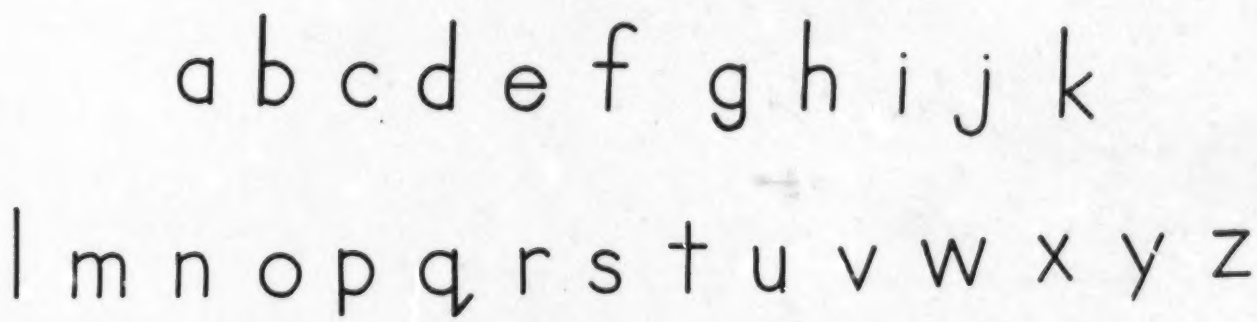


The Baroque period added flourishes and fancy decorations. This is the archaic form of cursive writing still taught in most American schools today, beginning about the Third Grade. It does not fit our computer age. When written quickly it becomes illegible.



In the early decades of this century it was common practice to expect children to use metal-tipped pens, liquid ink, and rough-surfaced newsprint for writing exercises. The pen often snagged on the paper fibers on the upstrokes and splattered the paper with ink. In 1922 Marjorie Wise, a concerned English educator, invented a new start-and-stop form of lowercase letters made entirely with downstrokes. To help children avoid ink blots, she separated lowercase letters into separate strokes, like capitals. Teachers sometimes refer to these letters as the ball-stick method, or simply manuscript. This has been the most common form of letters taught to American beginning writers since 1922.

Unfortunately, Wise didn't realize she was creating the same problems children have with capital letters: start-and-stop letters require young children to determine which direction to go with each new stroke at the time of life when laterality is often still undeveloped. Within two years Wise found so many handwriting problems developing, especially reversals, that she urged teachers to return to lowercase letters made with continuous lines instead of separate strokes(Connard 1935).

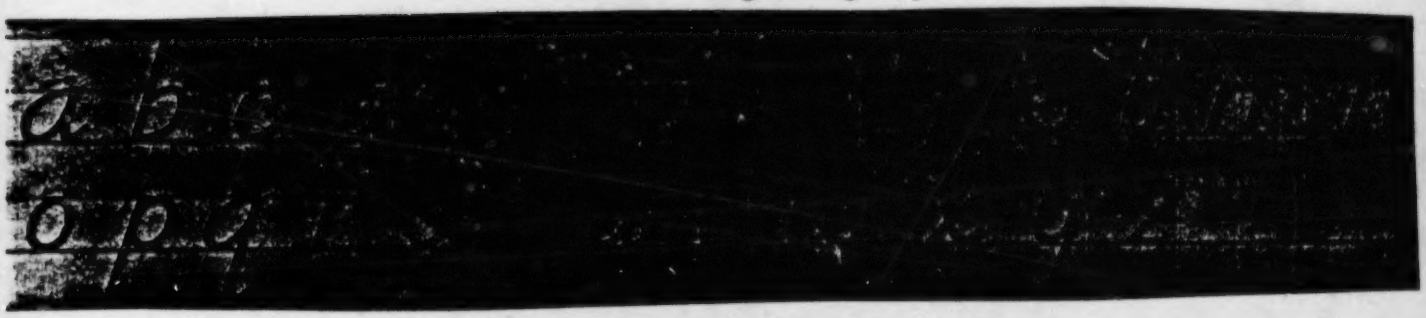


ball-stick alphabet

American educators ignored Wise's warning. The ball-stick alphabet is still the major form of letters taught to beginners in this country.

In recent years Donald Neal Thurber has revived chancery cursive in a form called D'Nealian (Thurber, 1983). One of the most important advantages of a continuous-line alphabet, such as D'Nealian, is that a second, different alphabet does not have to be learned in a later grade. Two simple curves are added to the beginning alphabet to make the joined form.

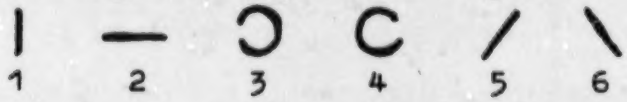
D'Nealian beginning alphabet



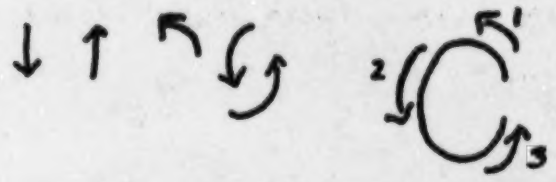
D'nealian joined alphabet

To further explore the question of which alphabet to use for beginners the author developed an alphabet difficulty scale using seven difficulty factors.

1. Based on the Beery-Buktenica Visual-Motor-Integration Survey, Follett Publishing Company, which summarizes research telling which strokes appear in children's scribbles as they mature from age 2 to 6. There is a left-right factor in this component:

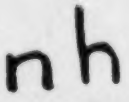


2. Directionality factor for up and down movements:

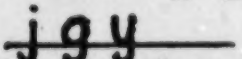


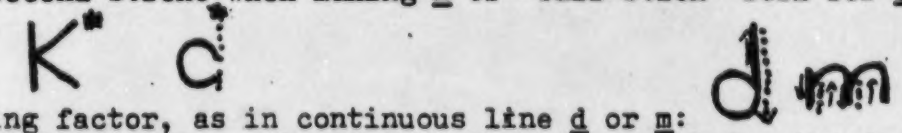
Example-- C has a directionality factor of 3 points. The line must go up--down--up.

3. Exact joinings of separate strokes: Capital A has a joining factor of 3--

4. Height factor: Some letters have a tall "stick": The child must discriminate between n and h-- 

5. Below the base line factor, as in the tails on j, g, and y.

6. Estimation factor, as in K and d: 
The child must determine where in "outer space" to begin the second stroke when making K or "ball-stick" form for d --



7. Tracing factor, as in continuous line d or m:
The child must learn to stay on the same track for the down stroke on d and the up strokes on m --

EXAMPLES: Capital L	Factor Number	Score	"Ball-stick" W
Maturation strokes.....	1.....	3	1.....22
Up-down.....	2.....	1	2.....4
Joinings.....	3.....	1	3.....3
Height factor.....	4.....	0	4.....0
Below base line.....	5.....	0	5.....0
Estimation.....	6.....	0	6.....2
Tracing.....	7.....	0	7.....0
Difficulty level (sum of factors)		5	31

Following this difficulty scale, Roman capitals sum to 327 difficulty points. Their major difficulty lies not only in their many exact joining points, but also in their number of diagonal strokes. Olson (1970) explains why diagonals are so difficult for young children. The problem lies in that a diagonal stroke moves in two directions at once, either up or down, and either to the left or right. Beery's survey has informed us that the diagonal toward the right side is the last writing stroke to develop. There are 11 of these in Roman capitals.

Following the difficulty scale, ball-stick manuscript and D'Nealian chancery cursive are similar in difficulty, 306 and 310 difficulty points. The advantage gained by using continuous line forms and thus avoiding the exact joining points of D'Nealian, is lost with the addition of the extra joining strokes on a, d, h, i, k, l, m, n, t, and u. These add ten extra difficulty points.

In order to design an easier alphabet for beginners the author developed a modified italic form. This alphabet has only three diagonals toward the right side (k, v and x). The D'Nealian joining strokes are eliminated. The rounded k, w and y are retained. Like D'Nealian, and unlike ball-stick, a second, different alphabet does not have to be learned in a later grade. These letters can easily be joined later as fluency develops. The author's simplified beginner's alphabet sums to only 276 difficulty points.

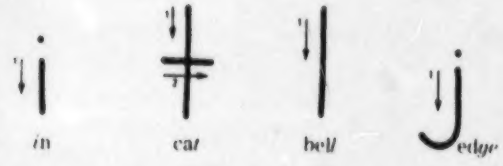
Simplified Beginner's Alphabet

The decision to begin teaching with this simplified lowercase alphabet, after many trials with hundreds of children, was based on utility, on difficulty, on alphabet history, and on child development.

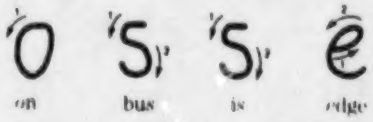
How should letters be grouped for instruction?
Guthrie (1952) suggests that "Every learning task must be analyzed into specific components that must be learned separately." This thought is the foundation behind programmed learning. To avoid the problem of reversals, therefore, letters which begin with a stroke toward the left (c, a, d, f, g, o, s) should be taught separately from those which begin with a vertical line and add a curve toward the right side (r, n, h, m, p, b, k) and the vertical plus under curve toward the right in u, w and y). The letters with only vertical and horizontal strokes should be taught first, and those with difficult diagonal lines last.

If the goal of this study was to develop a program which would help young children to record their own speech, it would be necessary to add six digraph patterns. The following sequence was selected:

Level 1

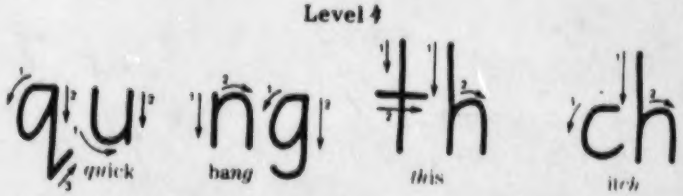


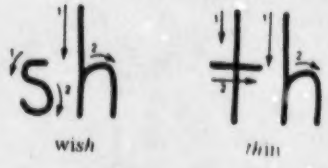
Level 2



Level 3

Level 4





Level 5

What verbal reference should be used for beginners--traditional letter names, letter sounds, or both?

Through trials with children, it was discovered that when both alphabet letter names and letter sounds are taught at the same time, this causes a confusion similar to that when both upper and lower case letters are taught simultaneously. Which then should be the beginning skill, alphabet names, or the major speech sound in the language represented by each letter?

Hunt (1961) recommended that the optimum time to teach a skill is when the brain centers controlling that skill are rapidly growing. Koffka (1959) reported that the brain centers controlling the fine distinctions between sound, so vital to acquiring spoken language, stop their growth spurt about five and one half years. Postponing the learning of the distinction between the very similar short vowel sounds of English then would seem to be a foolish practice. Early teaching of short vowel sounds would be even more important for young children whose second language is English. These speech sounds, usually not in their repertoire, would be much harder to distinguish after the sixth birthday.

Dewey's (1970) tables of speech sound frequency tell us that the Old English short sounds of the vowels still appear in Modern English about five times more frequently than the name sounds of the vowels.

Dewey Frequency Table

Letter	Frequency of Pronunciation	As in
a	13,174	at
a	2,149	ate
e	10,987	bed
e	3,333	bead
i	20,276	it
i	2,107	ice
o	9,150	on
o	3,584	open
u	3,768	up
u	498	use

Chomsky's (1974) and Lamb's (1976) observations of four, five and six year old children's invented spellings, as well as the author's trial studies, show us that alphabet letter name knowledge frequently causes miscues in beginning writing and spelling:

hk for chick	(the /ch/ sound is heard in the letter name for h)
gr for jar	(the /j/ sound is heard in the letter name for g and the ar pattern is heard in the letter name for r)
wog for dog	(the /d/ sound is heard in the letter name for w)

If children are so naturally curious about writing that they have to invent original coding systems of their own, then why keep the English sound-symbol system a secret from them? Why handicap them by beginning teaching with alphabet letter names? Why put road-blocks in their drive to learn?

The decision to begin with the most common speech sounds represented by the 26 alphabet letters, rather than by their a-b-c alphabet names, was therefore made on utility (the Dewey frequency studies), child development (Hunt and Koffka), and compassion (Chomsky and Lamb). Trials with children verified the simplicity of short vowel patterns of English. Long vowel patterns (using alphabet names) are often irregular and usually require the addition of other letters.

The two objectives leading toward the major goal of designing a program to teach children to write independent compositions before they could read were finally determined. Children would be taught to make the author's modified italic alphabet. They would associate each alphabet letter with its major speech sound in English rather than its alphabet name.

SEQUENCE

Which group of letters should be taught first?

Using the Beery scale, i, t and l are the easiest letters to make. The vertical-horizontal cross in t can be copied about the fourth birthday. This also coincides with Kellogg's timing for the beginning age of symbolization. Also, Dewey tells us that the short sound of /i/, as in it, is the most frequent short vowel sound in English.

Which group of letters should be taught last?

Dewey's scales tell us that lowercase letters made with diagonal lines have a mean frequency of appearance in English of 4,382, compared to the mean frequency of i, t and l, 30,343. Beery's survey tells us that the diagonal toward the right side is the last of writing strokes to develop.

Olson's study tells us that the young child perceives the diagonal long before he can reproduce it. Seeing his own errors would lead to unnecessary frustration. The decision to teach letters made with diagonal lines last was therefore based on utility (Dewey), child development (Beery), and compassion (Olson).

When teaching curves, should we be concerned with the point of entry or the point of arrival?

Curve in this study does not use the mathematical definition of the word. It refers, instead, to the more common usage, referring to a line that is part of a circle or oval.

The point of entry into the curve and the point of arrival are both on the same side in a, b, c, d, e, g, p and q. The problem is doubled with s. This is the major factor for common reversals of these letters.

Piaget (1971) discusses the problem, "At the Pre-Operational level of intuitive thinking in movement activities--usually under age six-- the child is concerned primarily with the point of arrival." This is apparent when observing young children learning circle games on the playground. The arbitrary clockwise or counter-clockwise movement rule must be clearly taught, or the young child centers on the goal of the game task (tagging his victim, or whatever else is required).

We also see the concern with the point of arrival in observations of squares made by typical four year olds. The first two strokes are made easily (usually down and toward the right). Then they often become so aware of

the point of arrival that they head for it in a quick curve, eliminating the upper right corner.

Trials with children confirmed the decision to divide letters with curves into two groups by the direction of the curve at the point of entry. If children start in the right direction with their initial stroke, they have a better chance of completing a letter correctly.

Should curves aiming toward the left side be taught first, or curves aiming toward the right?

The natural pull of the extremities toward the outside of the body to maintain balance would tend to favor right-curve letters for the right-handed child, and the opposite for the left-handed child.

Field trials with children, however, showed that, when right curves were taught first, this practice seemed to strengthen the natural pull toward the right. The most common left-curve letters were then harder to teach to right-handed children. Any tendency to reverse letters was thus aggravated by starting with right curves.

Left-handed children, who tend to be not so strongly sided as right-handed children, did not seem to be affected by the choice of the beginning curve group.
In the Dewey scales the letter d appears 17,046 times in English. The letter b appears only 6,838 times.

In Barnes' (1972) revision of the Dolch list of 100 frequent words the letter d appears 12 times, compared to the letter b only 5 times.

Durr (1973) did a word frequency count from a computer analysis of the 80 most popular trade juvenile books selected by primary children's library records. In his list the letter d appears 27 times, compared to the letter b 10 times.

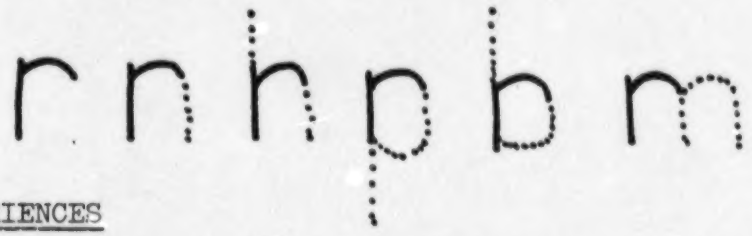
As the letters b and d are the most frequently reversed letters by primary children, these frequency studies would tend to favor the teaching of d first. Also, in the Barnes study the letter b appears as a beginning sound in all but one of the words in his list. The letter d, on the other hand, is a beginning letter only 6 times, a middle sound 2 times, and an ending sound 14 times. It would seem, then, that the instruction of the letter d for beginners should frequently include it as an ending sound.

The left curve group of letters includes three of the vowel letters (a, e, and o). These vowels appear ten times more frequently in English than the vowel u from the right group. Teaching the vowels early in the program will enhance the children's ability to make more words in their beginning writing lessons.

The left curve group of letters was finally selected over the right curve group after a search of the literature and intensive field trials with children.

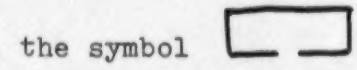
How should each group of letters be sequenced?
Guthrie tells us to analyze "acts" into their component "movements." Then teach these movements. A key letter was selected for each group of letters. This key letter was taught first as the foundation movement for the other letters in the group. For example, once the "stick-rainbow" pattern was

learned for r, the rest of the letter group could be taught as simple variations of the basic pattern.



EXPERIENCES

Searching for a way to motivate and sustain interest in alphabet writing for young children led to a study of early alphabet history. Fifteen letters of our traditional alphabet, still in use today in their Roman capital form, were invented 4000 years ago. They were originally simple outline drawings of objects familiar to another culture, and named in another language.

For example, the symbol  represented the Hebrew word, beth, meaning house. The design was the floor plan of a one room house with an open door. Seeing this symbol, and knowing the word in that language, made it a simple task to extract the beginning speech sound /b/ and associate it with the symbol.

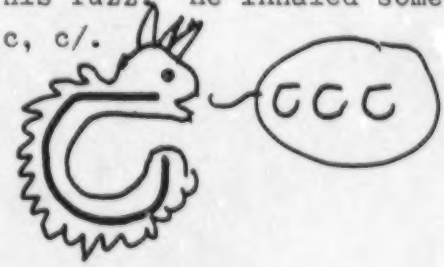
When the Greeks adopted this original phonetic alphabet they also adopted the original Hebrew names for the letters with slight changes in pronunciation (alpha, beta, gamma). These were not words for objects known to the Greek culture. Letter names thus became meaningless noises, rather than names for familiar objects. The task of learning the alphabet became a difficult memory task. The Greeks also used the alphabet for their numbering system (alpha was equivalent to one, beta, two, etc.) A constant order was necessary for numbering. We still follow their alphabet order.

For teaching sound-symbol activities to young children the author wondered about going back to the original Hebrew system beginning with outline drawings rather than abstract letters. Is it necessary to begin with the common beginning-sound concept for sound-symbol correspondence (B is for ball)?

Some kindergarten children are not ready for this concept. They are still more concerned with word endings. Usually they can rhyme. How can the beginning-sound system be avoided when teaching letter sounds? Toddlers can easily associate familiar pictures with sounds. They imitate the siren when they see a fire engine. They make animal noises when they see familiar pictures of farm or zoo animals.

The author wondered about the feasibility of designing a writing program for young children by building it around their natural drive to scribble and draw (Kellogg), combined with their interest in MAKING animal noises. An animal alphabet was designed with a lowercase letter forming the major structure of each animal. The cartoon format with "talking balloons" was used so that children would associate the animal's picture with its special sound.

A continued story was written about the twenty six animal letter characters. The story revealed why each animal was making its special sound. The caterpillar letter (c), for example, was combing his fuzz. He inhaled some fuzz and started to cough /c, c, c/.



A teaching manual was written to go with the stories. Expectations and activities were matched to the senscry-motor and pre-operational stages of cognition, suitable for typical four and five year olds, according to Piagetian theory. Every lesson was taught in five sensory modes in order to cover the major learning mode of all children. First, the children listened to a story about a letter-animal (auditory sense). Second, they were expected to repeat the animal's special noise (oral). Third, they participated in tactile and kinetic exercises. The major activity was directed drawing of the animal around its letter (tactile-kinetic). Finally, children were shown the letter in isolation (visual).

REWARDS

The children's eagerness to "meet a new creature" was the only reward necessary to sustain their interest in learning the letters and their sounds. Parents and teachers reported that at first the children could not read back what they had written. This agreed with Montessori's observation that writing is easier than reading. After a few weeks of practice at writing their own compositions they then began to be able to read them.

TESTING OF OBJECTIVE

In 1974-75, as part of a doctoral project, the author engaged in a comparative study of language arts programs in use in Kindergartens in the Napa Valley School District, California. Children being taught with the author's write-to read program were compared with children using more traditional approaches. Results follow. (Connell, 1975)

The NAPA Comparative Study

Population

Students: All kindergarten students enrolled in the Napa Valley Unified School District in 1974-75 were included in this study (994 students). There is little zoning of housing in the school district, either in urban or rural areas. There are no specific "pockets of poverty." The schools are naturally integrated and statistically comparable. In 1970, the last year when it was legal to give group intelligence tests in California schools, the median district IQ was 102. The range between schools was 100 to 104.

Teachers: Teachers volunteered to participate in the study in return for a set of materials. Nineteen classes formed the experimental *itl* group. Twenty-six classes formed the control group. The two groups of teachers ranged in age from 26 to 55. Their median age was 40. Their teaching experience ranged from 3 years to 20 years. For evaluation purposes, the director of elementary education and the director of personnel checked personnel files. The data indicated that the 19 participating teachers and the 26 nonparticipating teachers were as comparable in age and experience as human variability permits.

Procedures

The 19 experimental classes used the *itl* program with its "write-to-read" approach as their major language arts program for the school year.

The 26 control classes used a variety of other traditional published readiness materials of their own choice, including *DISTAR, Beginning, Alpha Time, Self-Pronouncing Alphabet,* and others.

Test Instrument

All children were pretested in October 1974 and posttested in May 1975 on the *Stanford Early School Achievement Test* (SESAT I). Only children with both pre- and posttest scores were compared. All children who scored in the ninth stanine on the pretest were eliminated from the comparison studies on the premise that there was insufficient ceiling on the test for valid growth scores for them. This left a population of 289 experimental pupils and 460 control pupils.

Results

1. There was no significant difference between the groups on the item analysis of *Environment* or *Aural Comprehension.*

2. Teaching in the experimental group did not stress letter names, capital letters, or comparison of words with the same beginning sounds. Teaching in some control groups did emphasize these activities. The experimental group, therefore, was disadvantaged on the *Letters and Sounds* item, which tests this knowledge. In spite of this disadvantage, the experimental group results were favorable.

Letters and Sounds:

Median Growth in Raw Scores

Experimental	8.62
Control	8.02
Difference	7.5%

3. Scott (1968) points up the relationship between math skills and beginning reading. He reports that seriation alone is more predictive of later reading success than other traditional reading readiness measures. Whimbey and Whimbey (1975), in their study of the development of intelligence, show that the ability to make logical analysis of facts is the common skill that is transferable from one subject to another.

The teaching of letters in sequence to form words contributed to higher math scores in the experimental group. The difference is significant:

Math:

Median Growth in Raw Scores

Experimental	7.25
Control	5.58
Difference	30%

4. Children scoring at stanine eight or nine on the SESAT I posttests were also administered the *Word Reading* and *Sentence Reading* components of SESAT II. A total of 245 students took the SESAT II posttest to determine how many kindergarten students could actually read at the end of the school year. The difference strongly favored the experimental group:

Median Growth in Raw Scores

	Word Reading	Sentence Reading
Experimental	43	13.3
Control	36	9
Difference	19%	47%

5. Particular attention was paid to classes whose median pretest scores were below the 52d percentile. There were four of these low classes in both the experimental and control groups, in spite of the original assumption that all kindergarten classes would enter school with similar potential.

The four experimental classes with the lowest scores at entrance (total raw scores in pretest) produced 40 students who scored at the ninth stanine on the posttest. The four comparable control classes produced 20 pupils who scored at the ninth stanine on the posttest. These 60 pupils took SESAT II with these significant results:

Median Growth in Raw Scores

	Word Reading	Sentence Reading
Experimental	29	5
Control	10	1.6
Difference	190%	213%

CONCLUSION

It would seem from the significant evidence from this long term study that teaching writing shows promise as an effective way to promote reading readiness in kindergarten. The results of the comparative study also indicate that writing is especially effective for pupils who enter kindergarten showing evidence of having the least readiness for success. Could it be that using the tactile-kinetic sense as the initial teaching mode gives these children an untraditional advantage?

Remember Helen Keller? The letter W was traced on her hand while water flowed over it. The continuous line of the letter evoked the association of moving water. She could neither see nor hear the water. But writing the letter on her hand, a tactile-kinetic association, made the initial breakthrough for her.

Could it be that writing can be the initial step toward success in literacy for others. The new brain research by Ornstein and others which explores the separate tasks of the two halves of the brain may give kindergarten teachers a clue. The left cortex processes language sounds and sequential tasks. The right cortex processes wholes, such as designs or letters. When young children write they do it aloud, uniting sight and sound. Could it be that writing for beginners is an activity which stimulates both sides of the brain at the same time, and develops interaction between them? Does this enhance the mental capacity for the reading act? Further research is needed.

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